S
CONTROL
Insect
Spruce Budworm
Beaverhead
Hebgen Control Unit

# SPRUCE BUDWORM PROJECT REPORT

## HEBGEN UNIT, 1957

STANDARD FORM NO. 64 FOREST SERVICE Dillon, Montana

# *Office Memorandum* • UNITED STATES GOVERNMENT

TO : Forest Supervisor DATE: July 30, 1957

FROM : C. P. Kern, Asst. Unit Supervisor, Hebgen Unit, by

SUBJECT: S - CONTROL - Beaverhead - Spruce Budworm 1957 - Hebgen Lake Report

Following is my report of the Hebgen SBW Unit, Beaverhead N.F. for 1957.

I realize that some of the comments made may be caused by a localized condition and may not be typical of the whole SBW program.

I hope that some help can be gained from this report in setting up a program for another year.

I have enjoyed working on the project and I hope that we achieved the goal of 90% kill on the Hebgen Unit.

# FINAL REPORT OF THE HEBGEN SPRUCE BUDWORM UNIT - 1957

I. Administration aspect of control program.

1. Hebgen Spruce Budworm Unit, Beaverhead National Forest, 1957.

2. The unit was mainly in the Madison and West Fork of the Madison River Drainages. The unit extended from Johnny Creek Ridge and South Fork of Indian Creek on the North to Red Canyon Creek on the Southeast and the Idaho-Montana Line on the West. There was 69,761 acres treated on this unit.

3. Spruce Budworm is responsible for the program. The intensity of infestation by percentage of infested area are as follows:

   High - 20% Medium - 69% Low - 11%

4. No comment - to be filled in from S.O. records. Refer to pre-spray summary

5. Development checking started on June 18 and the final mortality checks ended on July 31, 1957. The assistant unit supervisor arrived on the project on June 6. The unit biologist started on the project on June 3. I do not feel that either one of these two men arrived on the project in time to make the necessary preparations for the job. In the future the key men on the project should be given ample time to prepare themselves for the job by getting better acquainted with the project on the ground before the actual field season starts. In the future, I feel that the key men should be on the job no later than May 1st.

6. I feel that for the most part the infestation area boundaries were pretty well marked. Because there is a lot of lodgepole pine in the area, it is possible that a little clearer delineation between LPP and Douglas Fir could have been made. There again if the key personnel had been on the job earlier, more ground and aerial checking could have been done to separate the Lodgepole Pine out of some of the units.

   From an operational standpoint, I feel that the 1000 ft. limitation in block boundaries is about the minimum elevational difference that the units can be broken down to. However, I do not feel that this should be strictly adhered to, if by changing a little a clearer block boundary can be found. On some units it is very hard to instruct the pilot as to the exact location of the block boundary where a contour is followed. On a unit like this it might be better to put this boundary at 7 or 800 ft. and then run a straight line across drainages for the pilot to follow. In this way you would not exceed the 1000 ft. limitation on blocks, but would make a block boundary that would be possible to operate on efficiently.

7. No Comment.

8. Following is a list of the aircraft used on this unit.

(a) Spray Planes.
1. Tri Motor Ford - #9612
2. C-82 - #4828V
3. C-82 - #4829V
4. B-18 - #92801 D
5. Nordynn Norseman - #N13340
6. Stearman - #56947
7. Stearman - #N5113N
8. Stearman - #56044
9. TBM 3E - #1366N

As you can see we had a variety of planes operating on the unit. However, the major part of the unit was sprayed by the C-82 and the Ford Tri Motor. I feel that these two aircraft did an adequate job on the unit. The TBM operated on the unit for one day only. I feel that the TBM with an adequately trained pilot can do a good job on forest spraying. The TBM is a very hard on dirt runways, a factor that should be considered when placing them on the job. Because of engine trouble the B-18 only operated a short time, but I feel that it is plenty adequate for the job.

As far as the Stearmans and the Norseman are concerned, on a job of this type they operate under great handicaps, because of the high elevation of the area and because of their slowness when ferrying to and from the spray area. To get the most out of these airplanes the ferry distance should not be over 5 miles and the elevation not over 7500 ft. Even when these two conditions have been met there is some question as to the quality of the spray job done by these airplanes.

Unless topography of the area is a limiting factor, we feel that the larger faster aircraft of the C-82, & B-18 category can do as good or better job than the smaller slower aircraft. This is not meant to rule out the Ford Tri Motor because it can do a good job too, but it is meant to rule out the Stearman or Norseman. Of course there may be a certain type of area where the elevation is not over 7500 ft. and the canyons are very deep where it is necessary for these airplanes to be used. On the average I feel that it has no place on the Spruce Budworm Project for these small airplanes.

As to the pilots, for the most part we got a good job done because the pilots tried to do their best with the equipment available. Because the pilots are only human we got better jobs from some men than from others, but on the whole the caliber of the pilots was very satisfactory.

For observation planes we used a Cessna 180 and Cessna 182, primarily, with an occasional flight in the Cessna 195 and the Beechcraft Bonanza. Of the planes used, I feel that the Cessna 180 and 182 were the most satisfactory. Although the Cessna 195 is a high wing plane, it does not have the visibility of the 180 and 182. The Bonanza is low wing and does not have the visibility of the other three aircraft, but it is a little faster and can keep up with the C-82 and B-18 more readily.

Actually the ideal observation plane would be one with the visibility of the Cessna 180 with a cruising speed of 160 MPH and can be slowed down to an observation speed of around 100 MPH.

The number of observation planes per unit should vary according to the number of spray planes operating. I believe that this ideal combination would be to have one observation plane for every 2 spray planes operating on the unit.

9. The spray blocks on the unit were adequate as to number and average size. I do not believe that we can vary the block size to fit aircraft size because of the uncertainity as to which type of aircraft is going to fly the area. If the spray blocks are between 2 and 5000 acres, adjustments can be made at the time the area is sprayed so that combination blocks can be flown by large aircraft or large blocks can be broken down for spraying by small aircraft.

10. Forest Service Organization - Hebgen Unit

Assistant Unit Supervisor

Administrative Assistant
Camp Boss
Radio Operator
2 Weathermen
Aerial Observer
Cook
2nd Cook
2 Flunkies

Unit Biologist
Assistant Unit Biologist
5 Development Checkers
3 Spray Card Checkers
3 Airport Maintenance Men

As to the airport crew, I felt it was of adequate size to handle the job. I felt we needed at least one more fully equipped weatherman to be placed strategically on the unit.

This year the aerial observer was a smokejumper. Although he was a good man and tried to do his best, I feel that we need a more technically trained person to handle the job as aerial observer. I feel that the aerial observer should be at least a GS-7, Assistant Ranger or of similar caliber. A good well equipped aerial observer can really help the unit supervisor when it comes to making decisions as to whether the area has been adequately sprayed or not, or whether it is time to cut off spraying operations for the day. Therefore, it is very necessary to have a well trained person on this important job.

The camp boss on a job of this type should be one that can go ahead and make his own decisions as to ordering supplies, writing purchase orders, and making timeslips. A dispatcher with several years experience or an assistant ranger should be placed in this position.

The administrative assistant position was adequately concerned on the job. They need a person of high caliber with an ability in simple mathematics. School teachers for the most part have these abilities and should continue to be considered for this job.

The development checkers should be set up on the guideline of one checker to every 15 or 20,000 acres depending on the accessibility of the area instead of one to every 25,000 acres as the guidelines call for at present.

The assistant unit biologist is another position that should be reconsidered another year. This year we had a smokejumper in this position. While he did a good job and was an above average smokejumper, I feel that a person with the training and experience of at least an assistant ranger would do a better job in this position. With a person of this caliber on the job the unit biologist would be free to make more of the major decisions, to inspect areas and inspect the quality of the work more than he was able to do this year.

Another problem that came up in regard to personnel was the problem of living conditions. Many of the fellows that came on the job were just out of school and were short on finances. It was necessary for them to get credit wherever they could in order to survive. This is not a good situation because I feel that it affects the quality of the work that is done when so many of the fellows on the job are broke. Another year I suggest that either an advance on these fellows salary or per diem be made to tide them over until they get their first pay checks. A situation like this could look bad for both the government and other government employees if someone should leave without paying his bill.

c. Automotive transportation - There were 2 government vehicles and 4 contract vehicles assigned to the job. In addition to these 6 vehicles 4 of the development checkers and 2 weathermen used their own vehicles. For the contract vehicles we rented them for 15¢ per mile and furnished the gas, oil and repair. For the private vehicles we rented them for 8¢ or 15¢ and the driver furnished the gas, oil and repairs.

   The contract vehicles were 3 sedans and one 3/4 Ton pickup. For the type of work we had for these vehicles the sedans were not adequate.

   As far as vehicles are concerned I have 3 recommendations to make: (1) The ultimate in transportation would be to have all government pickups on the job. Another year it might be possible to get some on loan from the GSA equipment pool for this project. (2) If government vehicles are not available, make very sure that adequate plans are made in the preparation of the bid forms and contract for the contract vehicles so that all interested persons are advised that the bids are going to be let. The advertisement of the bids should be out by April 1st so that all interested parties can assemble equipment for the job. By doing it this way, I'm sure it will be to the advantage of the government. (3) Stress to the Washington Office the conditions under which we operate our vehicles so that we are not placed in the position of having to ask one of our temporary employees to operate his personal vehicle for 8¢ and furnish the gas, oil and repairs while at the same time we are renting contract vehicles for 15¢ and the government is pay-

ing the gas, oil, and repairs. I understand that this is beyond the control of the Region, but I do feel that an effort should be made to change this condition.

d. Communication facilities - On the Hebgen Unit there were no telephones. We had one master AM radio set and 3 SPF radios. For use during the time we sprayed the Madison River Canyon we had 5 FM radios. The AM radios worked fairly well, except during thunderstorms and in the evenings. Basically we needed a system of FM radio set up for the unit. This could have consisted of a repeater station or two and several more back packs. We should not consider having an operation of this type again unless we have a complete FM net set up for the unit. I feel that is is absolutely mandatory to have constant radio communication with the observation planes. This is not only a necessity from the operational standpoint, but from the safety standpoint as well. If we had of had a FM net set up so that we could have talked to Ennis, many of our problems would have been much smaller. Several times it was necessary to fly or drive to Ennis just because we had no communication during the evening hours when thunderstorms cut out AM transmission.

e. More work could have been done on the mosaics. Here again, if key personnel had been on the job earlier much of this work could have been taken care of. I would recommend that all ridges be marked on the mosaics as an aid in their use.

f. See attached SBW 12 for recommended changes on this form.

Form 8 should be revised and clarified. Bailey's ditto form or modification thereof might answer the problem better.

SBW 6 is revised to help the unit supervisor answer some of the questions that are continually being asked by project director and etc. and is attached.

11. No Comment.

12. Contractor ground organization. Basically this organization was not adequate. They had one man assigned to handle the insecticide and one man helped with fueling the aircraft. We actually needed one more man on the airstrip to help with the loading and handling of aircraft.

13. The Forest Service set up on the Hebgen Unit consisted of the 3 tents at the airstrip and the camp about 1 1/2 miles away. I feel that the area set aside for the tents, tanks, and the parking of aircraft was a little small. We should have an area at least 400 square feet to be used as parking area.

14. The contractor insecticide loading tanks and outlets were adequate. We had two meters, two gasoline pumps and one 26,000 gal. insecticide tank. We did suffer some inconvenience however because adequate facilities were not set up for servicing aircraft with fuel.

15. Safety - As far as Forest Service personnel are concerned, I know of no accidents

that happened on the job, nor of no near misses. Because the contractor, field crews were operating short handed it was necessary for them to, and as a result several times the contractor's man got an "insecticide bath" because of inadequate help.

We had one dumped load on the unit. The Stearman #56044, D. Bailey pilot, dumped a load of 125 gallons when his engine lost oil pressure on take off. He went ahead and landed, did some work on his engine and continued flying for the day.

The pilots all seemed to be recognizant of the hazards they were working under, and seemed to take all normal precautions. They particularly were careful to keep out of boxed canyons and watched for them constantly during briefing.

There was some talk this year that parachutes would not be required in observation planes in the future. I feel that this requirement should not be waived. As long as there is a fractional part of a percentage point that a person might survive because of his parachute it should be left in as part of the contract.

I feel that some modifications could be made on the daily spray aircraft inspection sheet SBW-14. On our unit, at least, about all the A & E mechanic did was to check the sheet off without so much as looking at the aircraft. With some study and consultation it might be possible to come up with a list whereby the mechanic would have to make a closer inspection of the aircraft.

16. On this unit, a special study was made of spraying the timber along the edge of the Madison River Canyon without getting spray in the river. We took several precautions to prevent damage to the fish from the spray.

(1) We picked very carefully the aircraft to be used for the job, namely the Ford Trimotor.

(2) We made arrangements with the Montana Power to have the river a little above normal flow during the time of spraying.

(3) We had two extra weathermen located at strategic points in the canyon to give us extra weather during the time of spraying.

(4) We very carefully briefed the pilot even to the point of having him fly the observation plane along the route of his spray plane before the actual operation took place.

(5) We put extra spray card lines along the river so that we could show how much spray went into the river.

(6) We went to special precaution to inform the campers along the river what we were going to do.

(7) We had extra overhead personnel on hand to observe and criticize the job as it was done. We had Montana State Fish and Game Personnel on hand to observe the operation.

From what I have heard and observed, I feel that the spraying of the Madison River Canyon was a success. I do not think any great amount of spray went in the river. Dave Scott of the Regional Office told me that Dick Graham of the M.S.F. & G. was very well satisfied with the operation. As far as I know, no fish were killed by the spray. I feel confident that by taking normal precaution, and by briefing the pilots a little more thoroughly than is normal most rivers can be sprayed with no ill effect on the fish.

17. Recommendations

1. I feel that we should not set up more than one operating airstrip per unit. One of the airstrips or the other is bound to suffer as far as contractor personnel are concerned.

2. I question the necessity of requiring an Aladis lamp at each airstrip.

3. If it is necessary to have a camp as a part of the operation, I recommend that all of the equipment for the camp be lined up long before the operation is to start, so that any shortage that may exist for the camp can be ordered early enough to take advantage of our normal procurement and supply procedures.

4. I recommend that all of the observation plane trips for pilot briefing be paid for by the government. That is, at least the trips to brief on each block at least once be paid for by the government. If the contractor changed the pilot before the area is sprayed then the contractor should pay for the second briefing that is necessary. If the government moves the plane before the pilot that has been briefed can spray the area, then the government can pay for the second briefing. I'm afraid that if the contractor has to pay for the briefing there might be a tendency to shorten up on briefing periods, and as a result we would get a poor spray job and thus waste government owned insecticide.

To Accompany Report.
Form Revision

Intermountain Forest & Range Experiment Station
Missoula Forest Insect Laboratory

Form SBW-6

Spruce Budworm Control Project

NOTICE OF SPRAY BLOCK RELEASE

Spruce budworm larval populations will be ready for spraying on the following blocks in the _____ Control Unit

on _____, _____:
day date

Acres released Prior to today: _____

| Biologist recommended Priority | Block No. | Block Name | Acres |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | Total Acres released Thru today | |

Approved: _____
Unit Biologist

Date: _____

1 copy each to:
- Unit Supervisor
- Project Director
- Entomologist-in-Charge
- Unit Biologist

II. Biological Aspects of Program.

1. Starting at the first part of June, 1957, the areas were checked and it was found that the budworm were very slow developing. This could be attributed to the late spring, cold wet weather and low temperatures. All of the budworm collected at this time were in the 1st & 2nd instars.

   There were 54 development plots established on the Hebgen Unit which gave each checker 10 and 11 plots. By taking half of this number each day, the checkers could handle this amount adequately. The majority of the blocks in this unit were fairly centralized and the travel distance from the headquarters to the blocks was limited.

   The development plots should be established as soon as possible so that the checkers can become familiar with the area. These plots should be so located that they can be reached by car or a short walk. If excessive walking is required, then the checker will not get around to all of his plots. Several of the plots established were at the same elevation but different exposures. There were 5 development checkers assigned to the unit which gave each one approximately 14,000 acres. I feel that 15,000 to 20,000 acres per checker should be set up in future projects.

2. (a) Daily development checking was started on June 18th and continued until July 17th. At the beginning of the project, the development was very slow and it was not until June 26th that any blocks had 75% or more in the 4th, 5th, and 6th instars. These areas were at a low elevation (5800 - 6200) and the majority had a medium-high infestation. On June 26th, the notice of start of spraying operations was submitted. On July 3rd, 10% of the area had developed to a stage where 60% or more were in the 5th and 6th instars and 3 blocks were released for spraying on this date. The time interval between the 10 day notice and releasing of blocks was 8 days.

   (b) There was a time interval of 4 days between the time of the first block releases and the first spraying. Spraying operations commenced on July 7th. The delay was due to the fact that no planes were available.

   (c) Block releases were made quite frequently after the initial release and the last block was released for spraying on July 17th. The highest areas were the last ones to be released due to the slow development. There were 2 blocks in the Hebgen Unit that started at 8000 feet and extended to 9000 plus feet. These areas were checked on July 15th by coordinator Lee Andrews and myself and it was found that the timber was scattered and consisting mainly of white bark pine, spruce and alpine fir. The budworm larvae were small and the infestation was light. I would recommend that the majority of this type should have considerable thought given before the block is included in the control program. A study should be started to see if there is not a 2-year cycle in these high areas rather than the normal 1-year cycle.

To accompany Report

Form Revision

NFA-SBW Form 12
Jan. 1957

_____ Control Unit

## RECORD OF OBSERVATION PLANE FLIGHTS

Contractor _____ Pilot _____ Aircraft Type and Number _____

| Date | Flt. No. | Flying Time | | | Load | | | | Mission |
|---|---|---|---|---|---|---|---|---|---|
| | | Out | In | Elapsed | Pass. No. | Frt. #s | | | |
| | | | | | | Observ. & Spray | F. S. Admin. | Pilot Biol. | |
| | | | | | | | | | |

Type of Mission and No. of Passengers.

4 Types of mission should be established.

1. Briefing pilot
2. Administrative
3. Observation of spray
4. Familiarization with area of Key Personnel.

Flights authorized by _____

Contractor representative's Signature

_____

Unit supervisor's signature _____

INSTRUCTIONS FOR USE

1. Use daily.
2. Under "Flying Time" "Out & In" record reading from aircraft tacometers or "Recording Tac". Allow incoming taxi and parking time only. No warmup time is included. If aircraft do not have recording tacometers, use standard time, allowing time from take off to landing and parking.

3 One copy to Unit Supervisor, one copy to contractor, and one copy to pilot.

(d) As soon as the development plot collections are made, I would recommend that a development chart be started. See attached form. Even though a record of the daily development is kept, I found that it was much easier to have all the information right at hand on one chart than to dig through all the daily reports. I feel that a form or chart of this nature is very worth the time required to keep it current.

As the project advances, there is a need of other records and charts. A list of block names, acreages, plot numbers and locations, spray card line numbers and locations and plot assignments should be made so that the checkers will know their schedule. By having this information, the unit biologist does not have to spend as much time with each checker. The checkers can get away much faster.

3. (a) Some of the blocks that had the 1000 feet altitude limitation worked out very satisfactory. Other areas should have had a 500 foot interval between the block boundaries. If all of the block laid within the thermo belt then it would be desirable to have 1000 foot intervals. However, if a portion of the block lies outside of the thermo belt, then the block boundaries should be 500 feet apart. One example of this conclusion can be given. In block 59 (south gap) the lower side was next to the Madison River in the Madison Canyon and this area was much slower in developing than the area above the midway point. All the cold air and high humidity that was carried through the canyon restricted the growth of the budworm. After getting away from these conditions the budworm developed faster. Another example is block 24 (Ruby Creek) the lower side developed faster than the upper portions of the block. A division line should have been made in this block and the lower part could have been sprayed sooner than the upper one.

(b) The majority of the blocks on the Hebgen Unit had the same aspect and there were no special problems noticed. With the same general aspect for the whole block, it worked very well.

(c) The acre size limitation, 2000 - 5000 acres, worked out good because of the type of planes used on this control unit. The smaller blocks could be completed and handled by the smaller aircraft while the larger blocks could be worked by the larger planes. If smaller planes are the only ones available, then the block sizes should be kept to the lower limits so that the block can be completed without any delay.

(d) I would recommend that future altitude limitations in this area be 8000 feet as the upper most extension of the block boundaries. After you get above 8000 feet, the trees become scarce, the timber type changes and the infestation becomes lighter.

Each block should have the same general aspect so that the whole block can be sprayed at the same time. If there are major aspect changes, then the development would differ which would change the spraying plans.

4. (a) Under certain conditions, the interior spray area delineations worked out satisfactory with the smaller planes. When the larger planes were used, the interior areas caused some problems. If the area is broken up with small delineations, an overage should be figured if large airplanes are used.

(b) 1. The interior nonspray areas should be large enough so that there is no question as to whether or not the area should or should not be sprayed. If the nonspray area is narrow but does have some length, it is difficult to turn off the spray while crossing the out area. However, if the flight pattern is parallel to the narrow strip, then there would be no problem. I feel that it is a matter of shape rather than size in determining if the delineation should be made. Also, the direction of the flight would be a deciding factor in determining what areas should be delineated out.

(b) 2. Without the benefit of topographic features, it was very difficult to determine where the host type and non host type started. Most of the areas on the Hebgen Unit, where both host andnon host types were present, no definite topographic features were available. It would be very desirable to have some topographic features when delineating the host and non host type.

(b) 3. It would be very desirable to have ridges, drainages, roads and other landmarks available for all the boundaries. The exterior boundaries are much easier to have special landmarks than are the interior boundaries. Definite ridges, peaks or roads could be used on exterior boundaries especially when the boundaries can be placed on the mosaics from contour maps.

5. Recommendations:

1. It would be very desirable for the unit biologist and part of the crew to be ready for work on May 1st. This would enable them to get all the mosaics, pilot cards, maps and other office work completed before field work. I would suggest that one individual be held responsible for completing each set of mosaics or pilot cards. There would be less chance for errors with one person working on a job than with several.

The pilot cards should be made so that more than just the block itself is shown. By having more information on the pilot cards, the pilots can orient themselves much easier.

2. A project of this nature requires the use of several vehicles in which they have to be acquired from a dealer. I would recommend that a dealer be notified 1 to 2 months in advance so that pickups could be contracted. This year passenger cars were acquired and they are not satisfactory for the job and the road conditions. These vehicles are on a contract basis, and I feel that the contract should be let in plenty of time so that the dealer can have pickups available.

3. Before the work load becomes too heavy and before you need the certain supplies, I would suggest that an ample supply be purchased. Submit the orders early and make sure you order enough to last the whole project. (See Supply List Attached)

4. When the development checkers first started the collecting and sorting of budworm, there was considerable trouble in distinguishing between diorytria, blackhead budworm, sawflies, and the budworm. I would recommend that a list be made consisting of all the distinguishing characteristics for each one of the aforementioned insects. It would also be very desirable to have pictures of each different insect most commonly collected. There was a shortage of technical literature covering insects common to this area.

5. When taking pre-spray mortality counts, I would recommend that 2 branches from 2 trees for 10 stations (40 branches) be taken. I feel that this is enough for a true picture. Also, I do not feel that 80 branches have to be taken on the post-spray mortality counts. I think the pre- and post-spray mortality counts should have the same number of branches.

Counters should be hired so that the pre- and post-spray mortality counts do not have to be counted by the crew. I feel that the girls who were counting the collections did a good job.

6. I would recommend that the same numbers and names be placed on the forms if new forms are devised. I ordered some SBW-16 Budworm Population Station Forms and received SBW-16 Report on Proposed Pest Control Project Forms. This does cause some inconvenience.

6. It was observed during the spraying project that there was considerable damage being done by diorytria, blackheaded budworm, and sawflies. Some of the areas had more diorytria present than budworm while other areas had several of the other kinds of bud damaging insects present. One of the areas that had more diorytria present than budworm was in an area that was sprayed in 1956 and again this year. I feel that there should be more knowledge acheived on these insects, especially the diorytria so that a control program can be set up if needed.

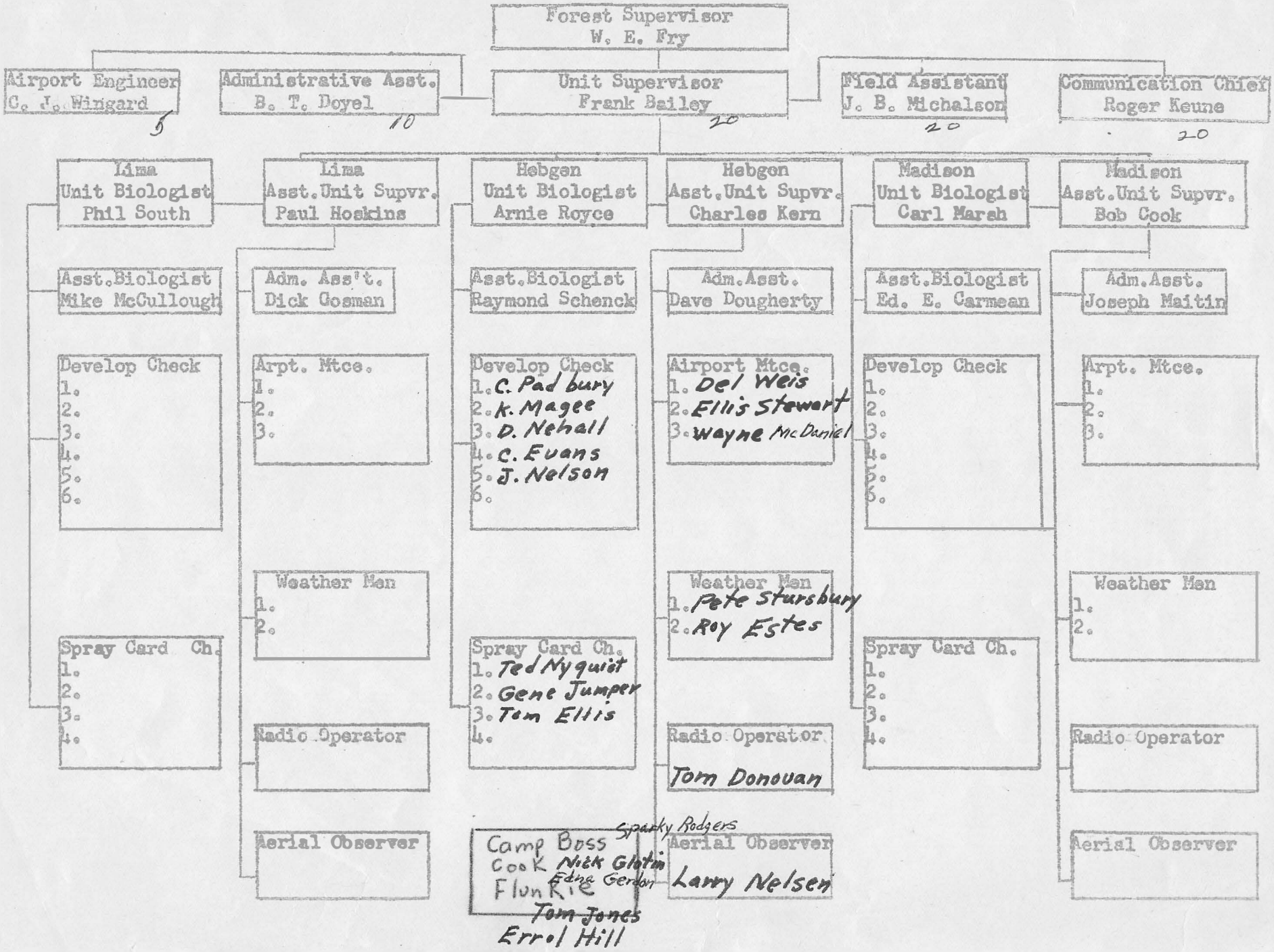
(Attached is one copy of each of the following: Progress Chart, Organization Chart, and Site Record.)

# SUPPLY LIST

Supplies and equipment needed prior to the beginning of the project.

1. Dissecting kits - enough so that each person has a complete set. (8 - 10)
2. Vials - 60 dozen.
3. Formalin or preservative solution - 3 to 4 gallons.
4. Clipper or pruning shears - enough so that everyone has a pair. (8 - 10)
5. Vial labels - 1000 gummed development plot labels.
6. Petri dishes - 1 dozen.
7. Watch glasses - 25 to 30 per unit.
8. Forms -
   - 100-150 Daily SWB Report - white sheets
   - 100-150 Daily SWB Report - yellow sheets
   - 250 Development Plot Data
   - 10 Notice of Start of Spraying Operations
   - 36 Block Releases
   - 100 Development Plot Tags
   - 1000 - 1500 Budworm Population Station
   - 100 Spray Card Line Starting Tags - red
   - 12 Diaries - Brown notebooks
9. Office Supplies: pencils, pen & ink, scotch tape, stapler, erasers, wax lead & pencils, rubber bands, paper clips.
10. Collecting cloths. (8-10)
11. Collecting bags. (8-10)
12. Sorting boards. (6-8)
13. First aid kits - pocket size. (12-18)
14. Snake bite kits - if needed. (8-10)
15. Small cylincal cardboard containers. (8-10)
16. Vial boards - 3 ft. long. ( 5)
17. File cabinet. ( 1 )
18. Instar samples - 10 complete sets.
19. String - 20 balls.
20. Altimeters - 2 to 3.
21. Eye glasses - 2 to 3.
22. Reading glasses - 3.
23. Compasses - 3 to 5.
24. Mosaics - 4 to 5 sets.
25. Overlay paper - 1 roll.
26. Maps - 12 $\frac{1}{2}$" maps of unit.

# SPRUCE BUDWORM ORGANIZATION CHART



Hebgen Unit Spray Area

Legend-

Spray Blocks in black

Development Plots in red